



Supplement of

Fluorescent bioaerosol particle, molecular tracer, and fungal spore concentrations during dry and rainy periods in a semi-arid forest

Marie Ila Gosselin et al.

Correspondence to: J. Alex Huffman (alex.huffman@du.edu)

The copyright of individual parts of the supplement might differ from the CC-BY 3.0 licence.

Sample Name	Start Time	End Time	Temp (°C)	Relative Humidity (%)	Rain Amount (Normalized)	Leaf Wetness (mV)	FAP Number Ratio (N_f/N_{tot})	Category
HiVol 1*	7/24/2011 18:53	7/25/2011 18:00	17.8	50.1	0.002	283.04	0.058	Dry
HiVol 2	7/25/2011 18:07	7/26/2011 18:01	18.8	55.3	0.015	268.49	0.071	Dry
HiVol 3*	7/26/2011 18:07	7/27/2011 18:07	15.8	62.6	0.008	308.61	0.166	Rainy
HiVol 4	7/27/2011 20:00	7/28/2011 20:00	16.2	71.3	0.031	316.77	0.144	Rainy
HiVol 5	7/28/2011 20:03	7/29/2011 20:03	16.1	71.3	0.000	323.43	0.102	Rainy
HiVol 6	7/30/2011 9:39	7/31/2011 7:59	18.2	64.7	0.000	265.93	0.111	Rainy
HiVol 7*	7/31/2011 8:02	7/31/2011 11:57	25.5	47.1	0.000	264.07	0.053	Dry
HiVol 8*	7/31/2011 12:01	7/31/2011 16:05	28.5	60.2	0.000	261.54	0.037	Dry
HiVol 9	7/31/2011 16:08	7/31/2011 20:04	23.8	71.3	0.000	261.64	0.045	Dry
HiVol 10*	7/31/2011 20:06	7/31/2011 23:57	16.4	72.4	0.000	262.85	0.055	Dry
HiVol 11	8/1/2011 0:01	8/1/2011 4:01	14.0	47.0	0.000	264.14	0.064	Dry
HiVol 12*	8/1/2011 4:03	8/1/2011 8:03	16.8	24.1	0.000	264.60	0.061	Dry
HiVol 13	8/1/2011 8:06	8/1/2011 20:00	22.4	40.2	0.002	272.02	0.065	Dry
HiVol 14*	8/1/2011 20:04	8/2/2011 20:26	14.5	59.3	0.090	323.79	0.163	Rainy
HiVol 15*	8/2/2011 20:28	8/3/2011 20:04	15.2	83.4	0.019	319.09	0.241	Rainy
HiVol 16	8/3/2011 20:06	8/4/2011 0:07	12.1	93.1	0.023	311.64	0.281	Rainy
HiVol 17*	8/4/2011 0:09	8/4/2011 4:10	10.1	81.0	0.000	345.84	0.348	Rainy
HiVol 18*	8/4/2011 4:13	8/4/2011 8:12	12.3	45.2	0.000	316.78	0.290	Rainy
HiVol 19*	8/4/2011 8:15	8/4/2011 12:17	20.6	66.2	0.000	268.53	0.131	Rainy

HiVol 20*	8/4/2011 12:19	8/4/2011 15:57	16.5	89.9	1.088	345.72	0.114	Other [†] (Rainy)
HiVol 21*	8/4/2011 16:00	8/4/2011 20:12	12.3	91.5	0.021	340.62	0.189	Other [†] (Rainy)
HiVol 22	8/4/2011 20:14	8/6/2011 20:03	16.3	66.8	0.001	303.36	0.170	Rainy
HiVol 23	8/6/2011 20:05	8/7/2011 20:05	19.3	46.2	0.000	280.55	0.097	Dry [†] (Rainy)
HiVol 24	8/7/2011 20:12	8/8/2011 19:48	16.4	36.0	0.000	261.57	0.072	Dry
HiVol 25	8/8/2011 19:49	8/9/2011 20:11	18.6	39.6	0.000	276.79	0.082	Other
HiVol 27	8/9/2011 20:13	8/10/2011 20:02	15.7	41.5	0.000	273.60	0.089	Other
HiVol 28	8/10/2011 20:05	8/11/2011 19:53	17.0	61.3	0.001	300.35	0.061	Other [†] (Rainy)
HiVol 29	8/11/2011 19:54	8/12/2011 19:51	16.4	51.3	0.000	267.80	0.061	Dry
HiVol 30	8/12/2011 19:52	8/13/2011 19:47	17.3	52.2	0.000	291.40	0.075	Dry
HiVol 31	8/13/2011 19:48	8/14/2011 19:54	18.5	53.3	0.000	264.41	0.082	Dry
HiVol 32	8/14/2011 19:55	8/15/2011 20:05	17.5	57.8	0.000	281.19	0.073	Dry
HiVol 33*	8/15/2011 20:06	8/16/2011 19:47	15.0	51.2	0.003	278.96	0.080	Dry
HiVol 35*	8/16/2011 19:48	8/17/2011 20:05	16.9	63.0	0.000	303.81	0.101	Dry
HiVol 36*	8/17/2011 20:06	8/18/2011 19:47	18.2	55.7	0.000	295.59	0.072	Dry
HiVol 37*	8/18/2011 19:48	8/19/2011 20:07	17.8	41.8	0.000	262.09	0.074	Dry
HiVol 38*	8/19/2011 20:08	8/20/2011 20:08	18.1	47.3	0.000	265.92	0.071	Other [†] (Dry)

18 **Table S1:** Summary information for each hi-volume filter sample including: start and stop times (local
19 time; U.S. date format m/dd/yyyy), average air temperature, relative humidity, rain amount (normalized to
20 2.0) leaf wetness, number ratio of fluorescent particles from the UV-APS, and wetness category
21 determined as described in Section 3.1. Star symbol (*, first column) indicates samples used in fungal
22 DNA determination. Cross symbol (†, last column) indicates that category assignment was manually
23 changed from the algorithm determination (original category in parentheses). N_f represents the number of
24 fluorescent particles, N_{tot} represents the number of total particles as measured by the UV-APS.

Figure	Linear Fit Parameters	
	Rainy	Dry
5.c	$y=38.0x-21.8$	$y=2.0x+8.1$
5.d	$y=54.9x-37.5$	$y=2.9x+8.3$
5.e	$y=32.0x+11.9$	$y=18.8x+6.9$
5.f	$y=41.6x+14.6$	$y=9.9x+9.2$

25

26 **Table S2:** Linear equation fit parameters for Rainy and Dry conditions for Figure 5c-f. Each equation
 27 represents the linear trend line for correlations of arabitol (5c,e) or mannitol (5d,f) with UV-APS FAP
 28 mass (5c,d) or WIBS Cl 1 FAP mass (5e,f).

Figure	Linear Fit Parameters	
	Rainy	Dry
6.d	$y=0.4x+11646$	$y=0.2x+5064$
6.e	$y=0.3x+9613$	$y=0.2x+1939$
6.f	$y=0.004x+236$	$y=0.01x+83$
6.g	$y=0.9x+15514$	$y=1.4x+5389$
6.h	$y=0.9x+12683$	$y=1.1x+4094$
6.i	$y=0.005x+313$	$y=0.05x+190$

29
30 **Table S3:** Linear equation fit parameters for Rainy and Dry conditions for Figure 6d-i. Each equation
31 represents the linear trend line for correlations of estimated fungal spores (m^{-3}) from (6d,g) arabitol,
32 (6e,h) mannitol or (6f,i) colony forming units (CFU) with (6d,e,f) UV-APS FAPs or (6g,h,i) WIBS Cl 1
33 FAPs.

Particle Mass Percentage (%)			
	Dry	Rainy	Other
CI1	2.15 ± 1.38	16.98 ± 10.14	4.03 ± 3.42
CI2	4.72 ± 1.43	6.01 ± 1.57	6.68 ± 2.38
CI3	19.92 ± 5.81	13.22 ± 5.78	23.79 ± 10.60
CI4	4.44 ± 1.64	8.83 ± 3.73	6.53 ± 3.45
FL 1	8.42 ± 3.37	62.05 ± 35.10	24.70 ± 23.61
FL 2	18.51 ± 4.02	71.55 ± 31.34	38.26 ± 24.77
FL 3	36.79 ± 6.26	85.95 ± 28.23	61.77 ± 28.29
FL	38.01 ± 6.34	87.99 ± 28.53	64.92 ± 30.66
UV-APS FAP	25.53 ± 2.99	51.50 ± 14.83	32.87 ± 9.45
Total Particle Mass ($\mu\text{g m}^{-3}$)			
UV-APS Total	3.70 ± 1.11	2.70 ± 0.58	4.85 ± 2.56

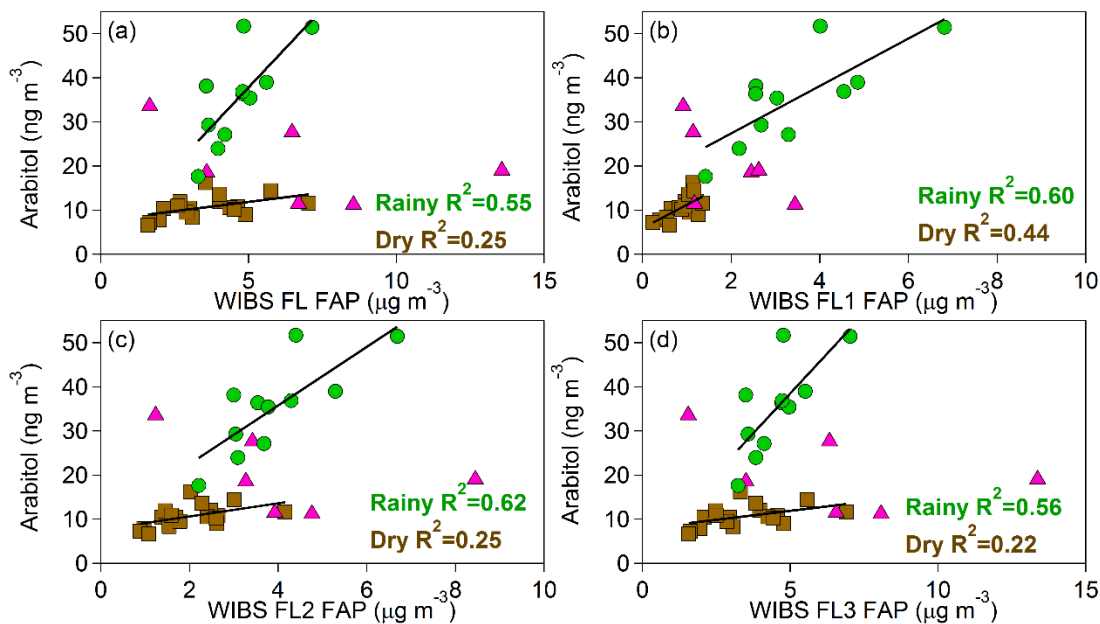
34

35 **Table S4:** Percentage of particle mass in various UV-LIF instrument categories and total particle mass.
36 Each mass value compared to total particle mass, determined using UV-APS number size distributions,
37 converted to a mass for particles of aerodynamic diameter 0.5 – 10 μm and using particle mass density of
38 1.5 g cm^{-3} . WIBS particles were integrated into total number over the same size range in optical diameter
39 and using unity density. Ranges shown are standard deviation of 5-minute time averages.

Particle Type	FL1 Fluorescence Intensity	FL2 Fluorescence Intensity	FL3 Fluorescence Intensity
A	I>Threshold		
B		I>Threshold	
C			I>Threshold
AB	I>Threshold	I>Threshold	
AC	I>Threshold		I>Threshold
BC		I>Threshold	I>Threshold
ABC	I>Threshold	I>Threshold	I>Threshold

40
41
42
43
44

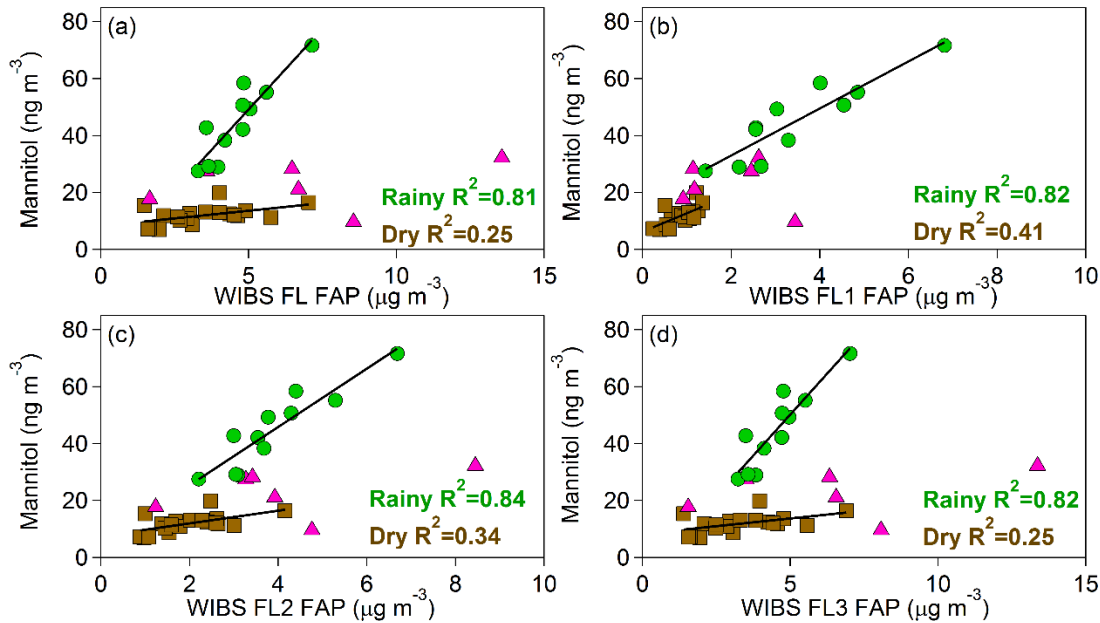
Figure S1: Particle type assignment strategy for WIBS data. Particle category type defined as fluorescent in a given channel when the fluorescence intensity (I) in channel FL1, FL2, or FL3 is greater than the threshold value, defined as blank + 3SD. Colors correspond to particle type used also in Figures 2-3.



45
46
47 **Figure S2:** Atmospheric arabinol concentration (ng m^{-3}) correlated with WIBS fluorescent
48 particle mass ($\mu\text{g m}^{-3}$) (a) any fluorescent particle, FL; (b) particles fluorescent in channel 1,
49 FL1; (c) particles fluorescent in channel 2, FL2; (d) particles fluorescent in channel 3, FL3. R^2
50 value shown for each fit in a-d. Linear fit parameter are shown in the table below.

Figure	Linear Fit Parameters	
	Rainy	Dry
S2.a	$y=7.1x+2.4$	$y=0.8x+7.6$
S2.b	$y=5.4x+16.7$	$y=5.3x+5.9$
S2.c	$y=6.6x+9.2$	$y=1.5x+7.6$
S2.d	$y=7.2x+2.4$	$y=0.81x+7.8$

51
52 Linear equation fit parameters for Rainy and Dry conditions for Figure S2a-d. Each equation represents
53 the linear trend line for correlations of arabinol (ng m^{-3}) with WIBS fluorescent channel particle mass (μg
54 m^{-3}). (a) any fluorescent particle, FL; (b) particles fluorescent in channel 1, FL1; (c) particles fluorescent
55 in channel 2, FL2; (d) particles fluorescent in channel 3, FL3.



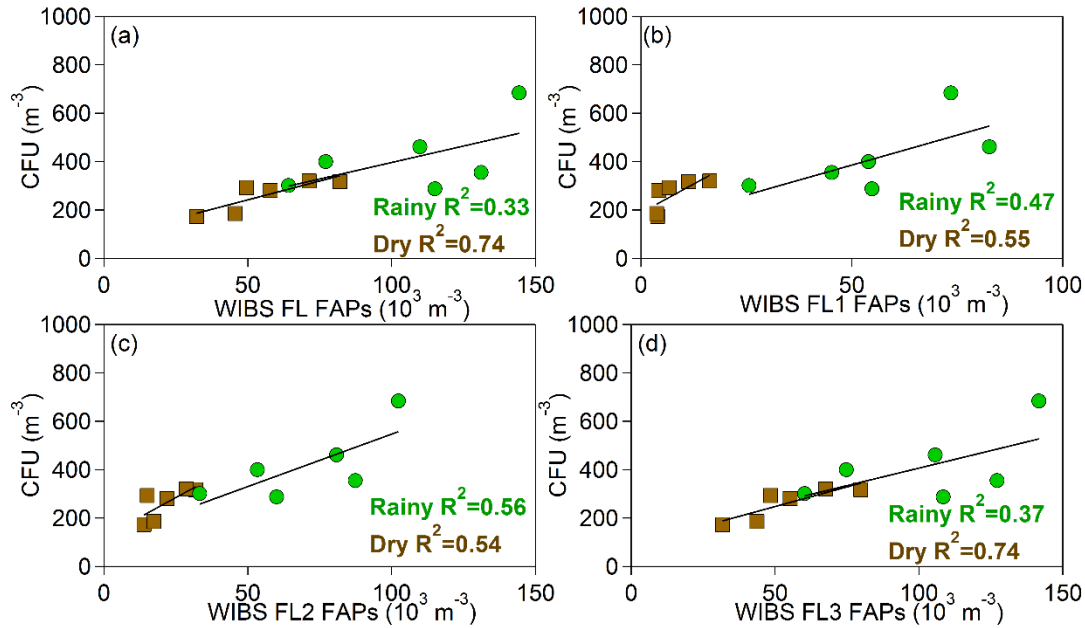
56

57 **Figure S3:** Atmospheric mannitol concentration (ng m^{-3}) correlated with WBS fluorescent particle mass
 58 ($\mu\text{g m}^{-3}$) (a) any fluorescent particle, FL; (b) particles fluorescent in channel 1, FL1; (c) particles
 59 fluorescent in channel 2, FL2; (d) particles fluorescent in channel 3, FL3. R^2 value shown for each fit in a-
 60 d. Linear fit parameter are shown in the table below.
 61

Figure	Linear Fit Parameters	
	Rainy	Dry
S3.a	$y=11.3x-7.5$	$y=1.1x+8.2$
S3.b	$y=8.3x+16.4$	$y=6.5x+6.2$
S3.c	$y=10.3x+4.9$	$y=2.2x+7.5$
S3.d	$y=11.5x-7.4$	$y=1.1x+8.2$

62

63 Linear equation fit parameters for Rainy and Dry conditions for Figure S3a-d. Each equation represents
 64 the linear trend line for correlations of mannitol (ng m^{-3}) with WBS fluorescent channel particle mass (μg
 65 m^{-3}). (a) any fluorescent particle, FL; (b) particles fluorescent in channel 1, FL1; (c) particles fluorescent
 66 in channel 2, FL2; (d) particles fluorescent in channel 3, FL3.



67

68 **Figure S4:** Atmospheric colony forming unit (CFU) concentration (CFU m^{-3}) correlated with WBS
 69 fluorescent particle (m^{-3}) (a) any fluorescent particle, FL; (b) particles fluorescent in channel 1, FL1; (c)
 70 particles fluorescent in channel 2, FL2; (d) particles fluorescent in channel 3, FL3. R^2 value shown for
 71 each fit in a-d. Linear fit parameter are shown in the table below.
 72

Figure	Rainy Linear Parameters	Dry Linear Parameters
S4.a	$y=0.003x+124$	$y=0.003x+86$
S4.b	$y=0.005x+138$	$y=0.009x+189$
S4.c	$y=0.004x+113$	$y=0.006x+122$
S4.d	$y=0.003x+118$	$y=0.003x+84$

73

74 Linear equation parameters for Rainy and Dry conditions for Figure S4a-d. Each equation represents the
 75 linear trend line for correlations of colony forming units (CFU m^{-3}) with WBS fluorescent channel
 76 particles (m^{-3}). (a) any fluorescent particle, FL; (b) particles fluorescent in channel 1, FL1; (c) particles
 77 fluorescent in channel 2, FL2; (d) particles fluorescent in channel 3, FL3.